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Kawamura et al.

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(54) **DEVICE FOR DISCRIMINATING AMONG PRINT MEDIA**

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(52) **U.S. Cl.** **250/559.4**; 347/105
(58) **Field of Search** 250/559.39–559.46, 250/559.16; 356/239.1, 239.7, 429–431, 446; 399/389; 400/708; 347/14, 105, 106

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(74) *Attorney, Agent, or Firm*—Sughrue Mion, PLLC

(57) **ABSTRACT**

A pair of optical sensors are disposed above photopolymer plates and interleaf papers, which are alternately stacked with one another. These optical sensors basically have the same structure. However, the optical sensor is disposed so as to be inclined to an optical axis of reflected light, and therefore, a detection level of the optical sensor substantially becomes low. Accordingly, although the optical sensors each react to the reflected light from the photopolymer plate, the optical sensor does not react to the reflected light from the interleaf paper. As a result, it is determined whether the uppermost layer of the stack is the photopolymer plate or the interleaf paper. In a discriminating device of the present invention, general purpose optical sensors adapted to react to light having such a fixed intensity or greater, are used.

23 Claims, 12 Drawing Sheets

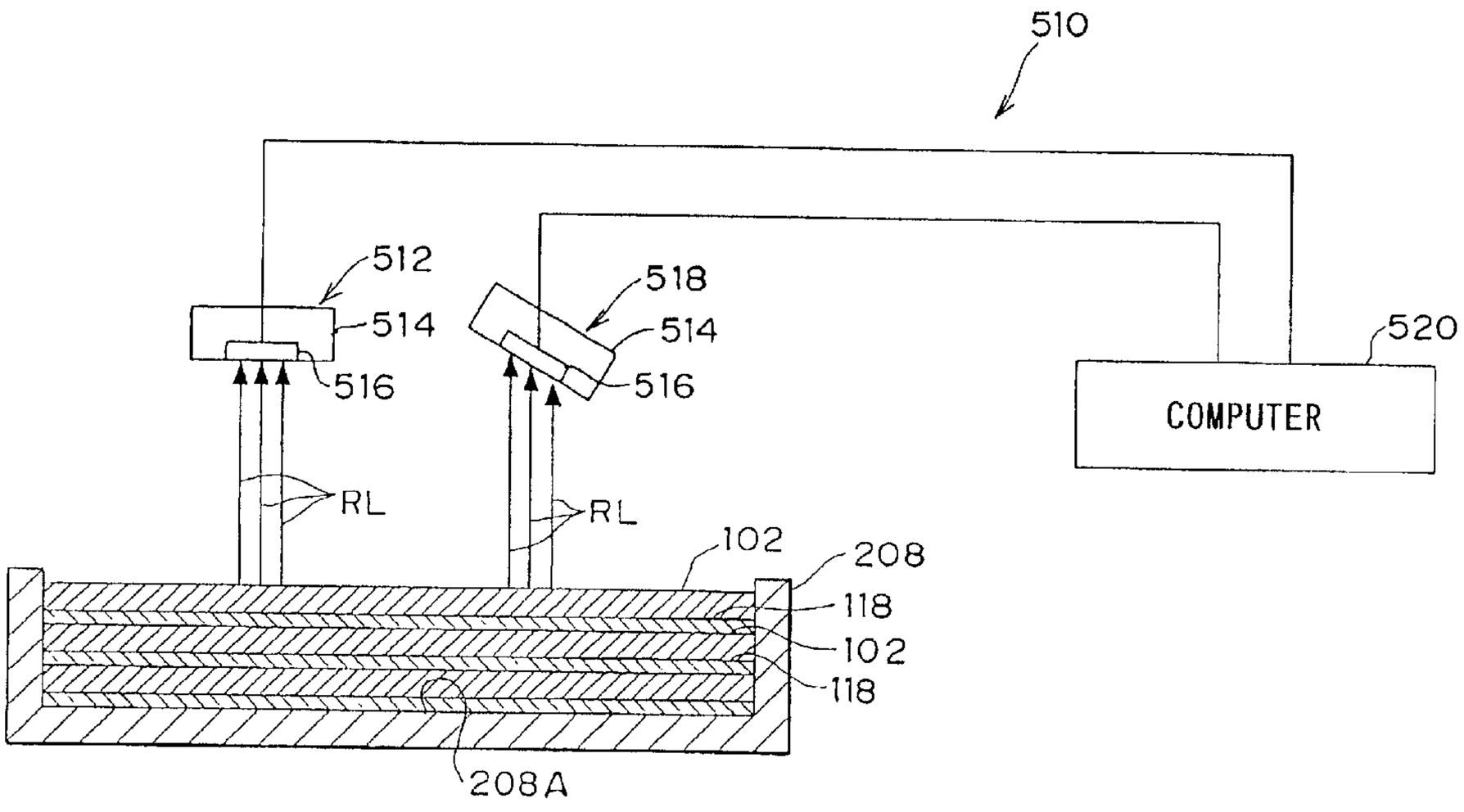


FIG. 1

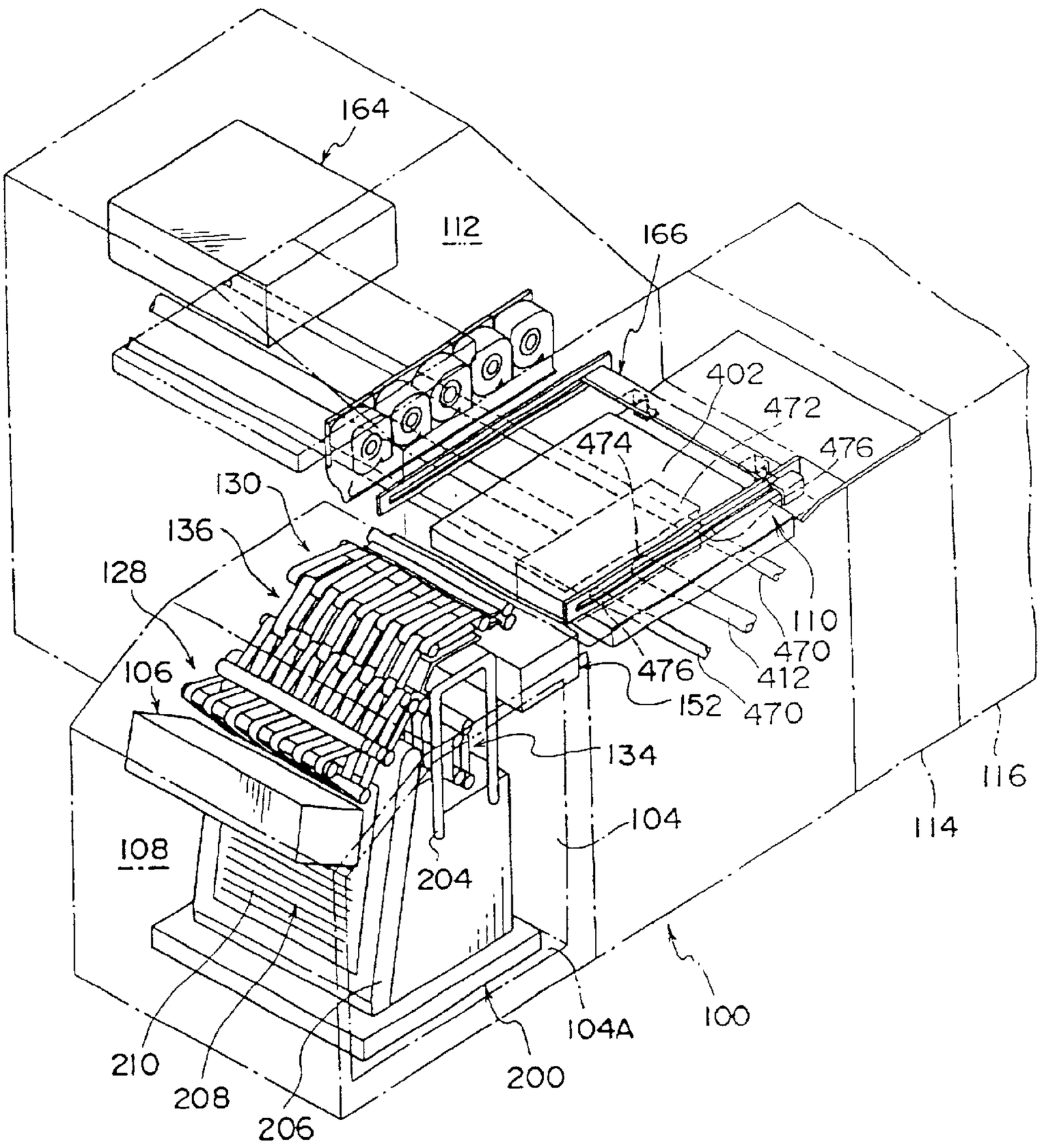

164
112
166
402
472
474
476
130
136
128
106
110
470
476
412
152
470
134
116
114
104
108
204
210
208
206
200
104A
100

FIG. 2

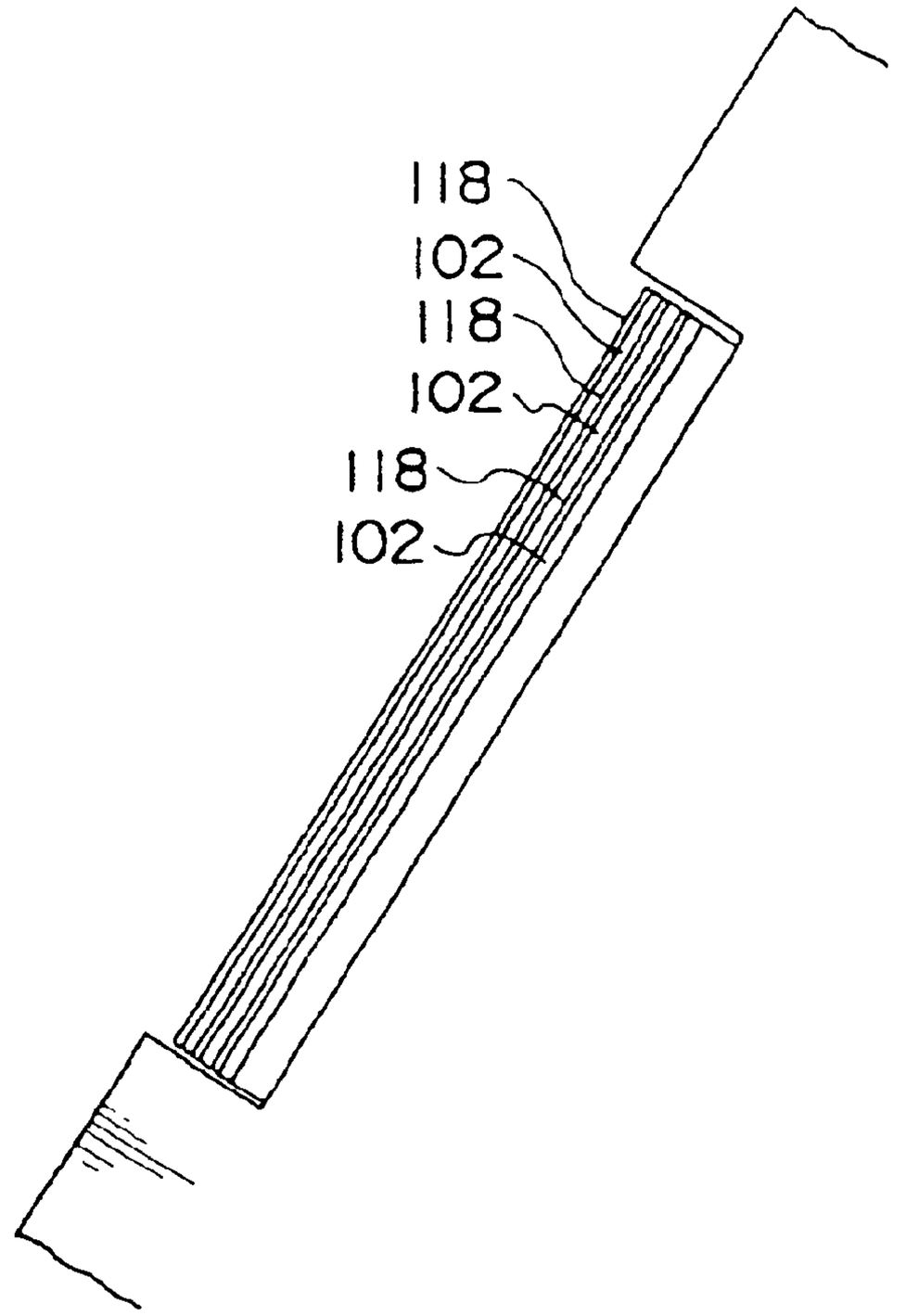


FIG. 3

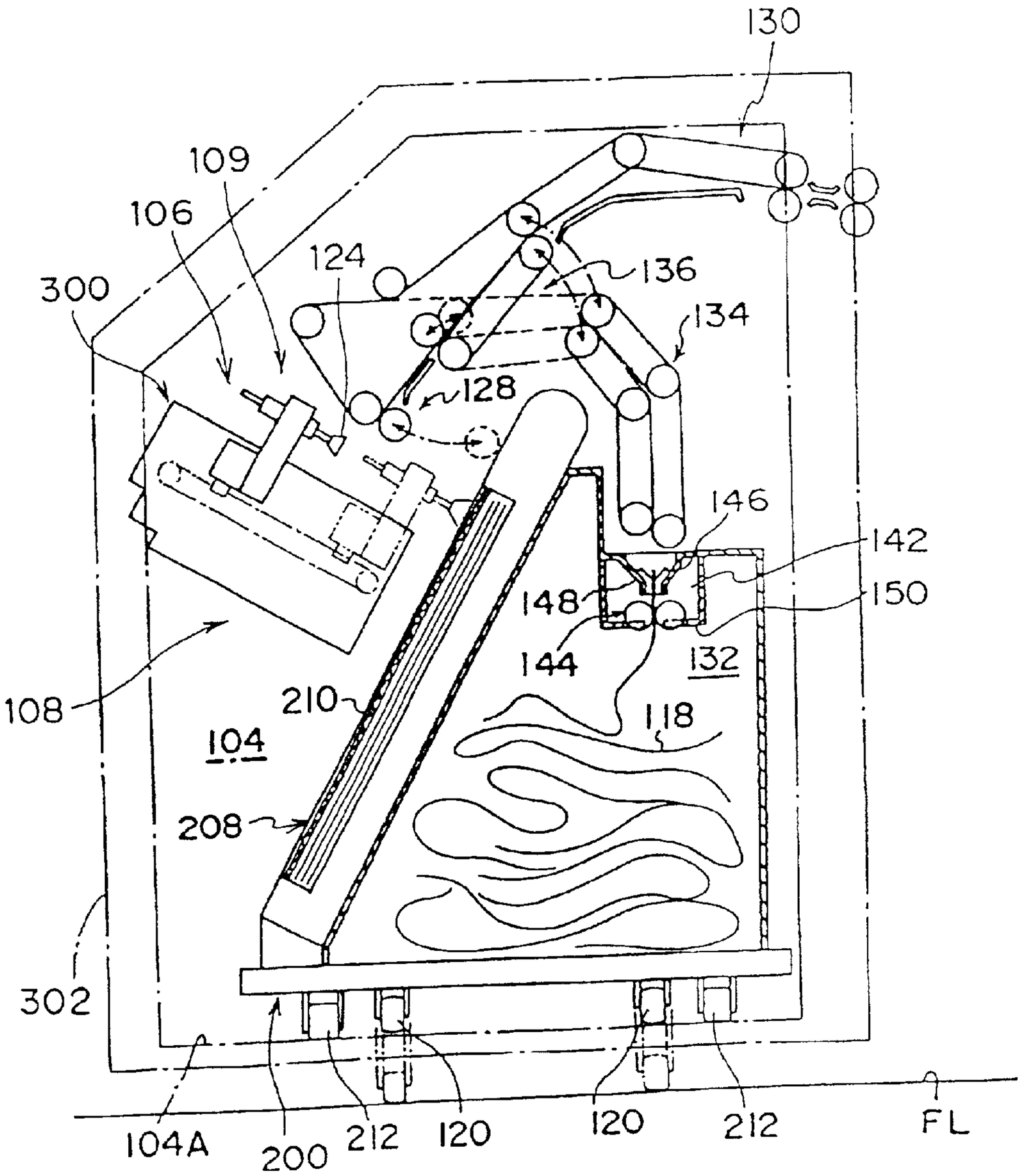

130
109
106
124
300
136
134
128
146
142
148
150
144
132
108
210
104
118
208
302
104A
200
212
120
120
212
FL

FIG. 4A

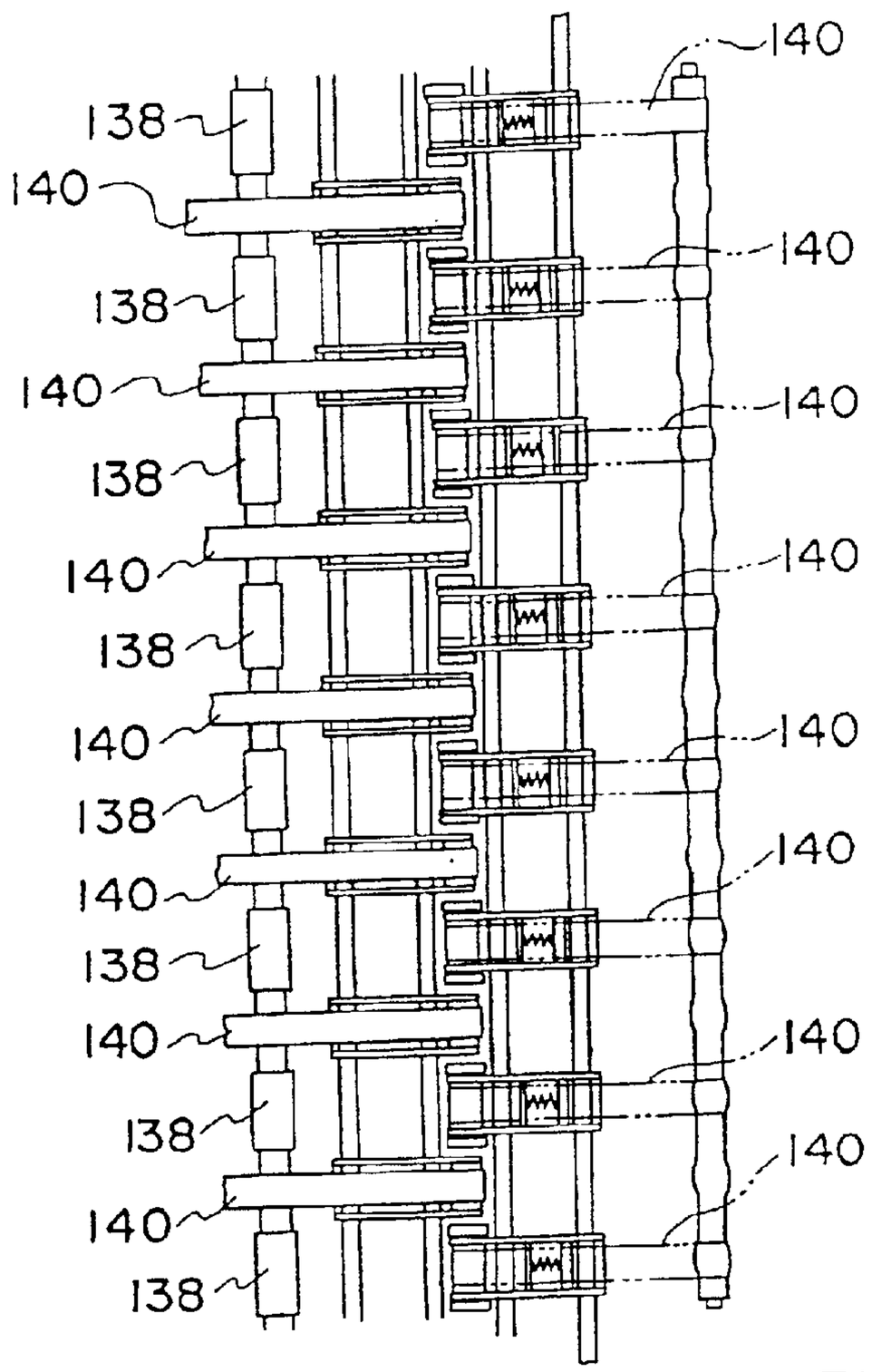


FIG. 4B

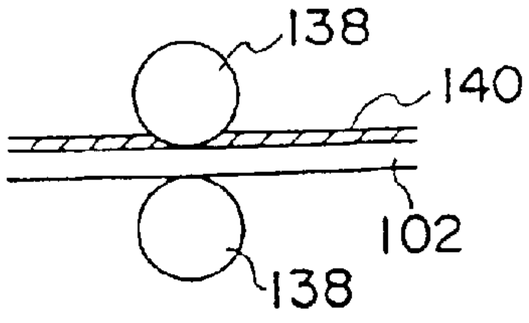


FIG. 4C

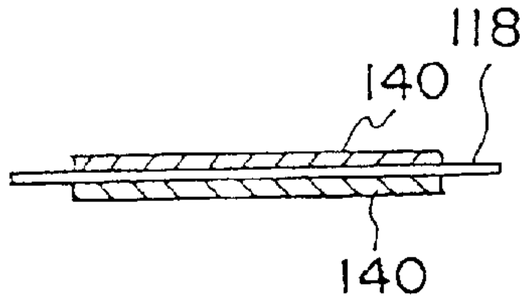


FIG. 5

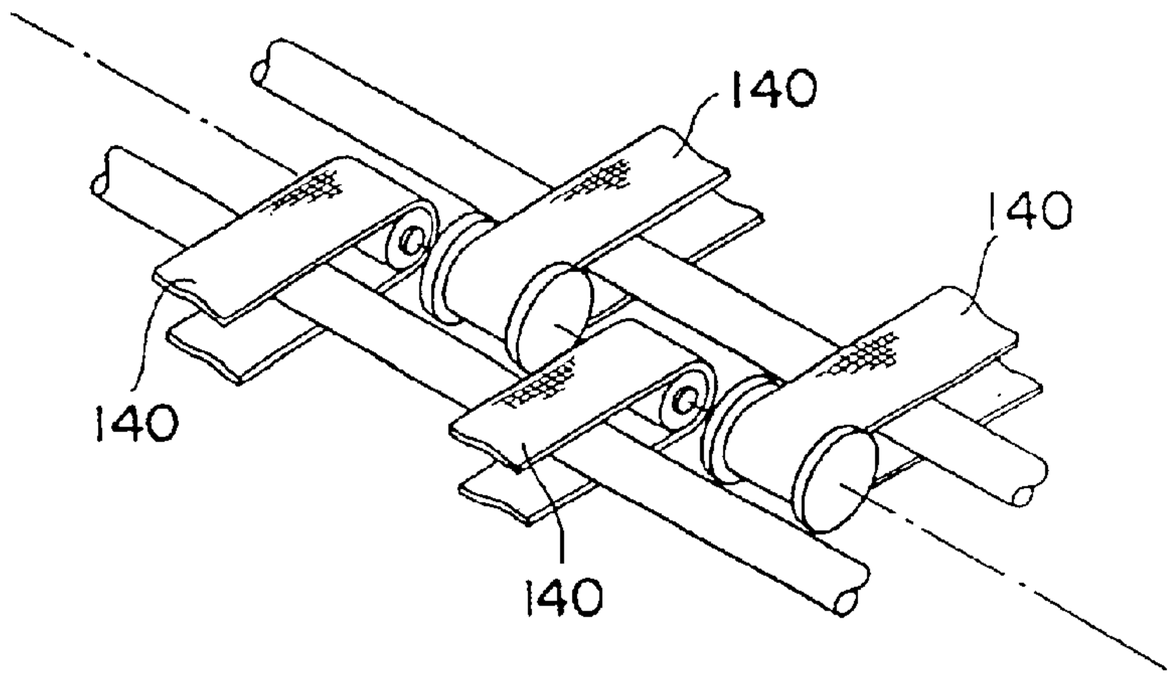


FIG. 6

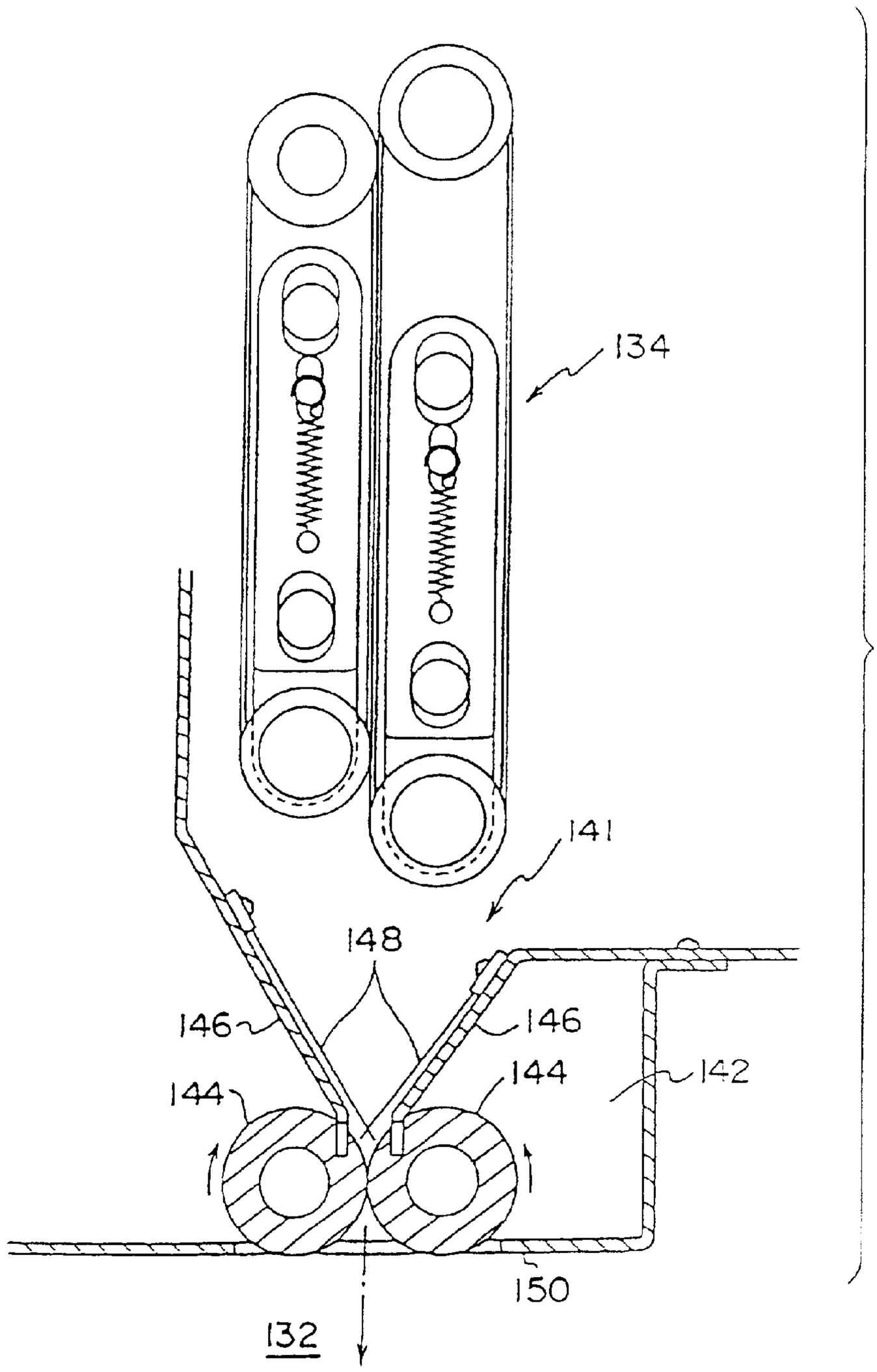


FIG. 7

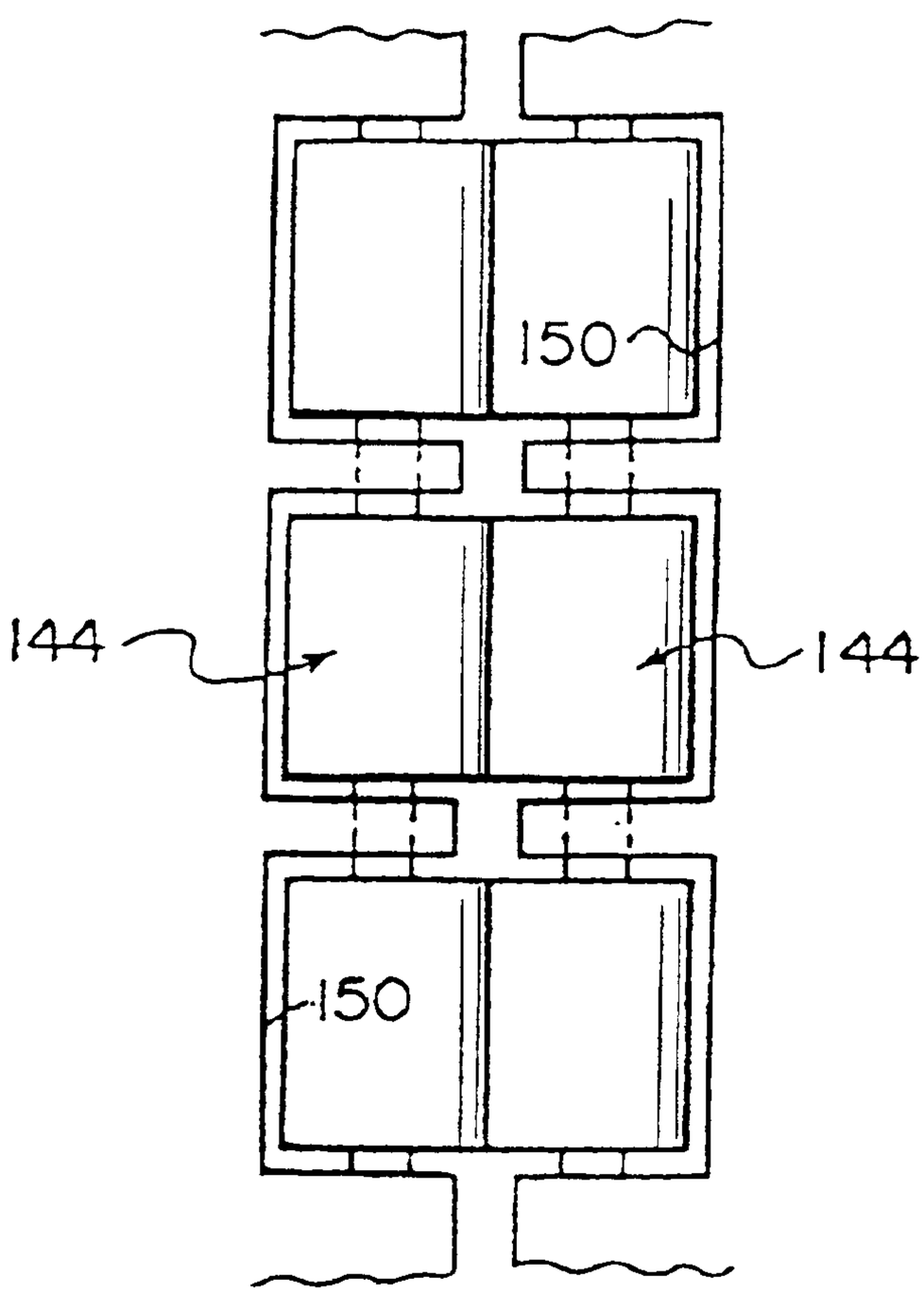


FIG. 8A

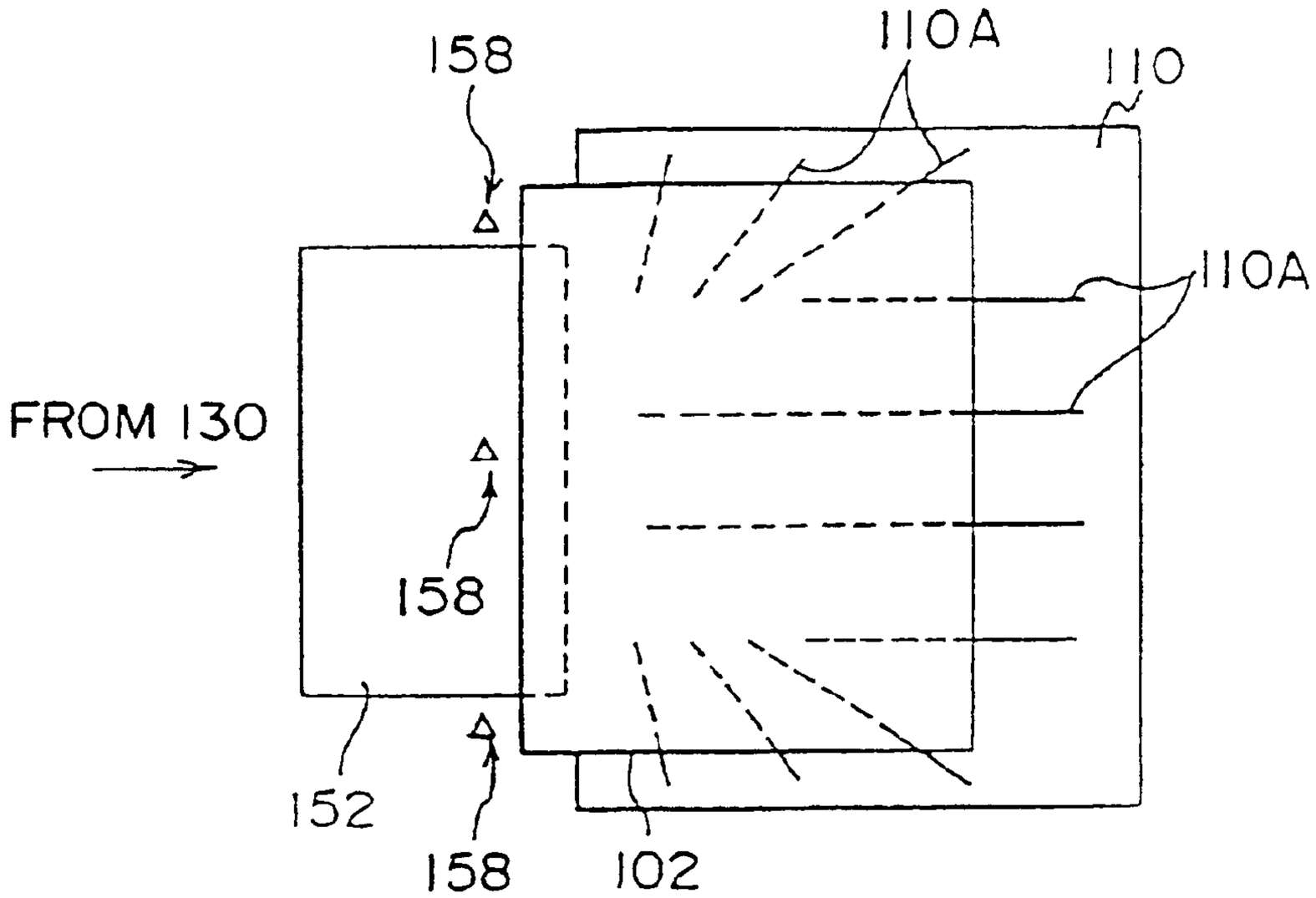

158
110A
110
110A
FROM 130
158
152
158
102

FIG. 8B

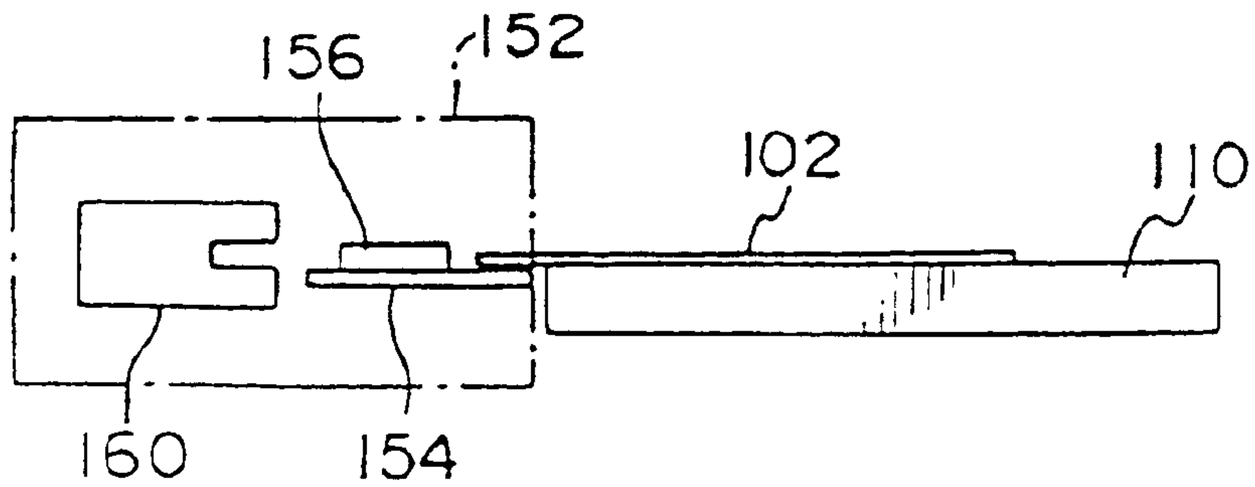

156
152
102
110
160
154

FIG. 9A

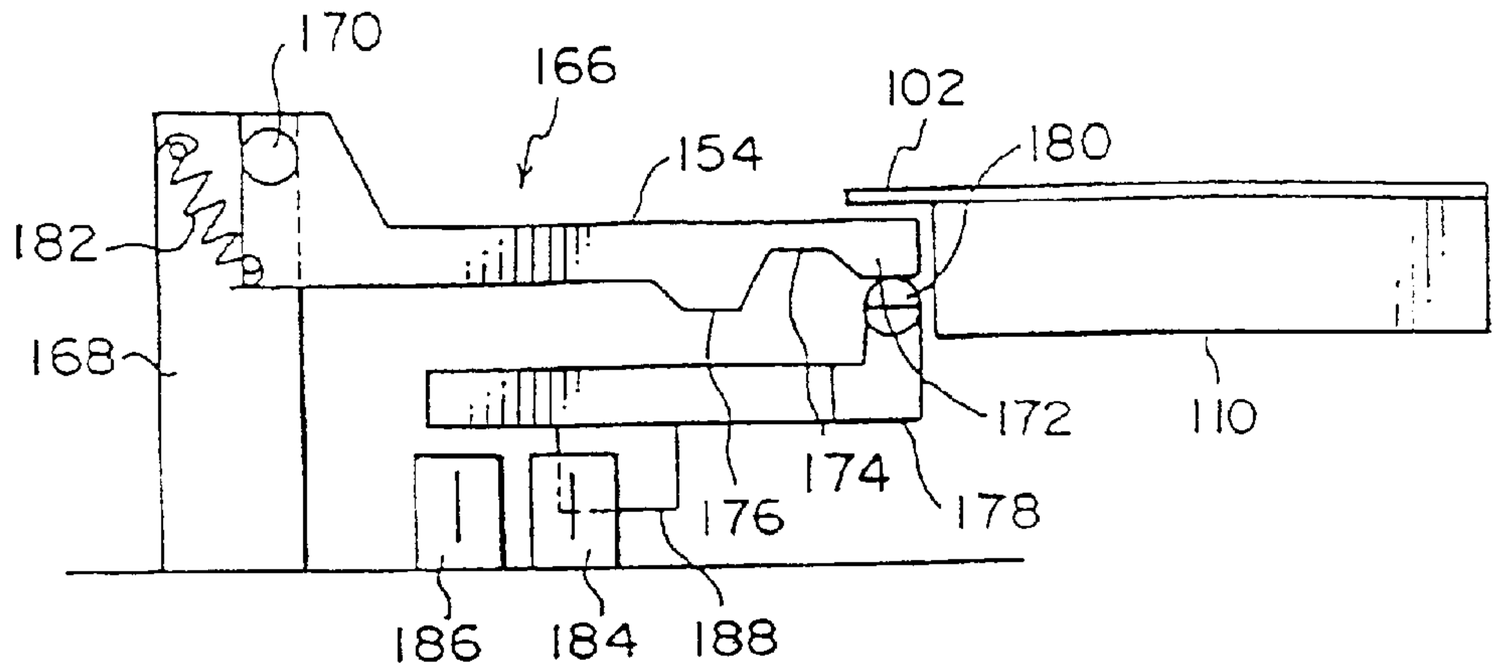


FIG. 9B

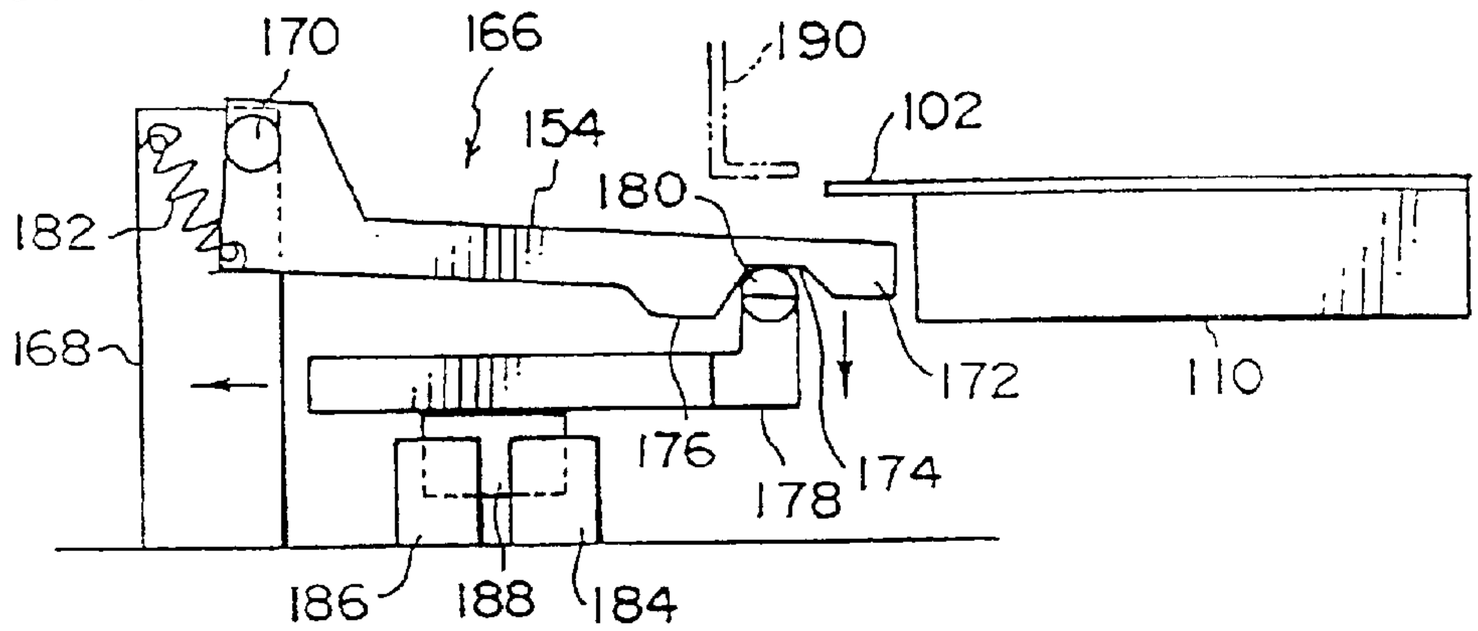
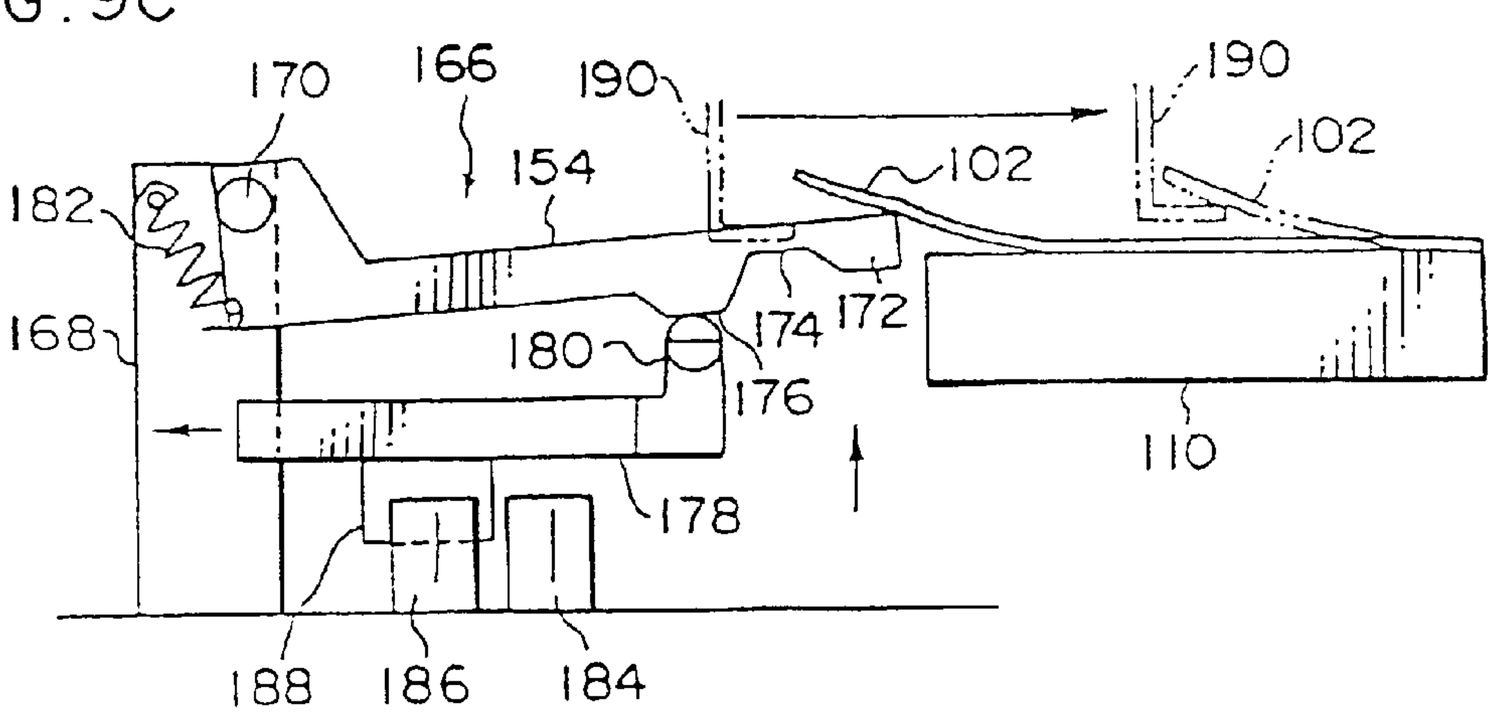
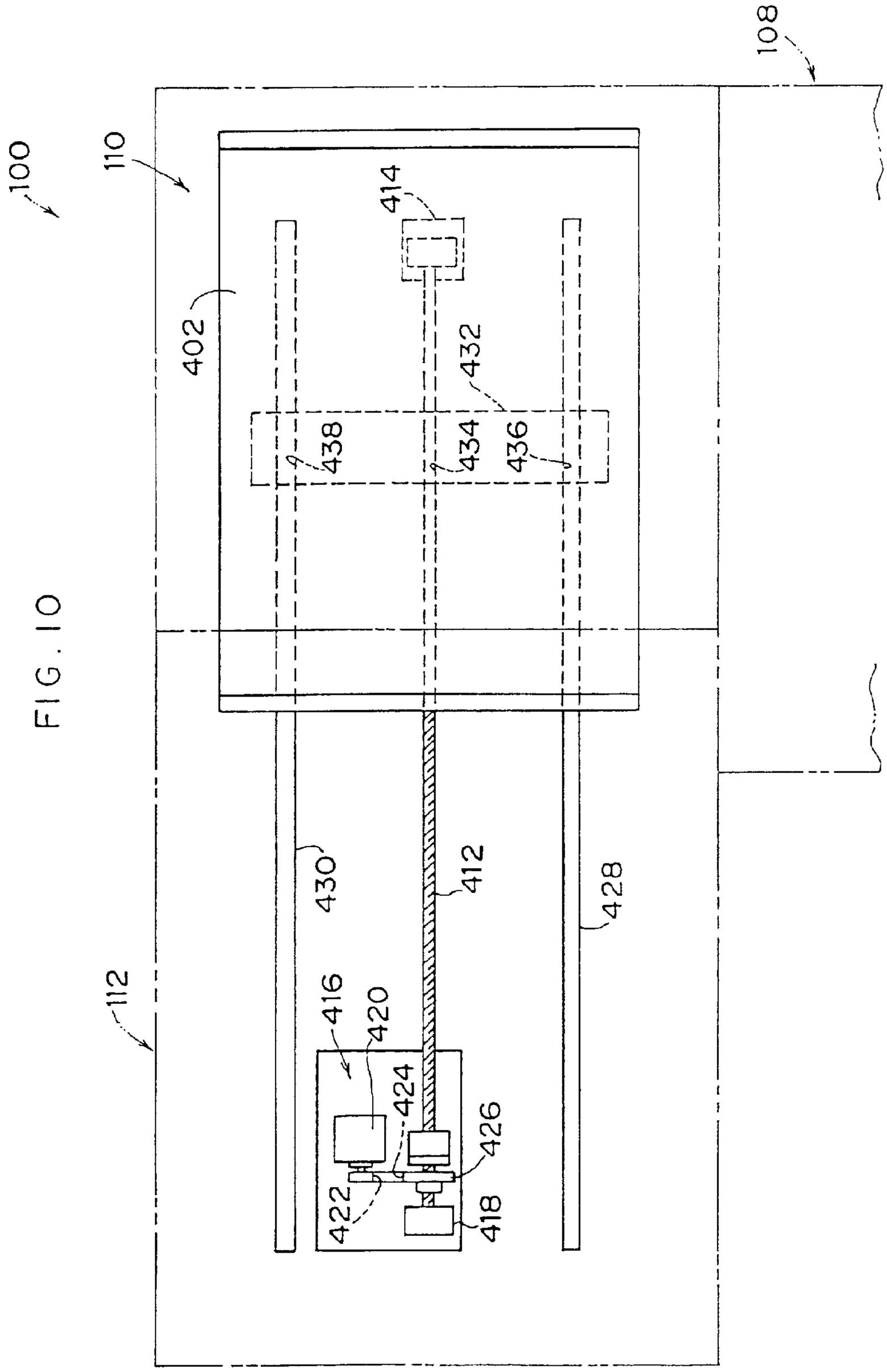


FIG. 9C




100
110
108
112
414
402
432
438
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430
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424
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422
418

FIG. 10

FIG. 11

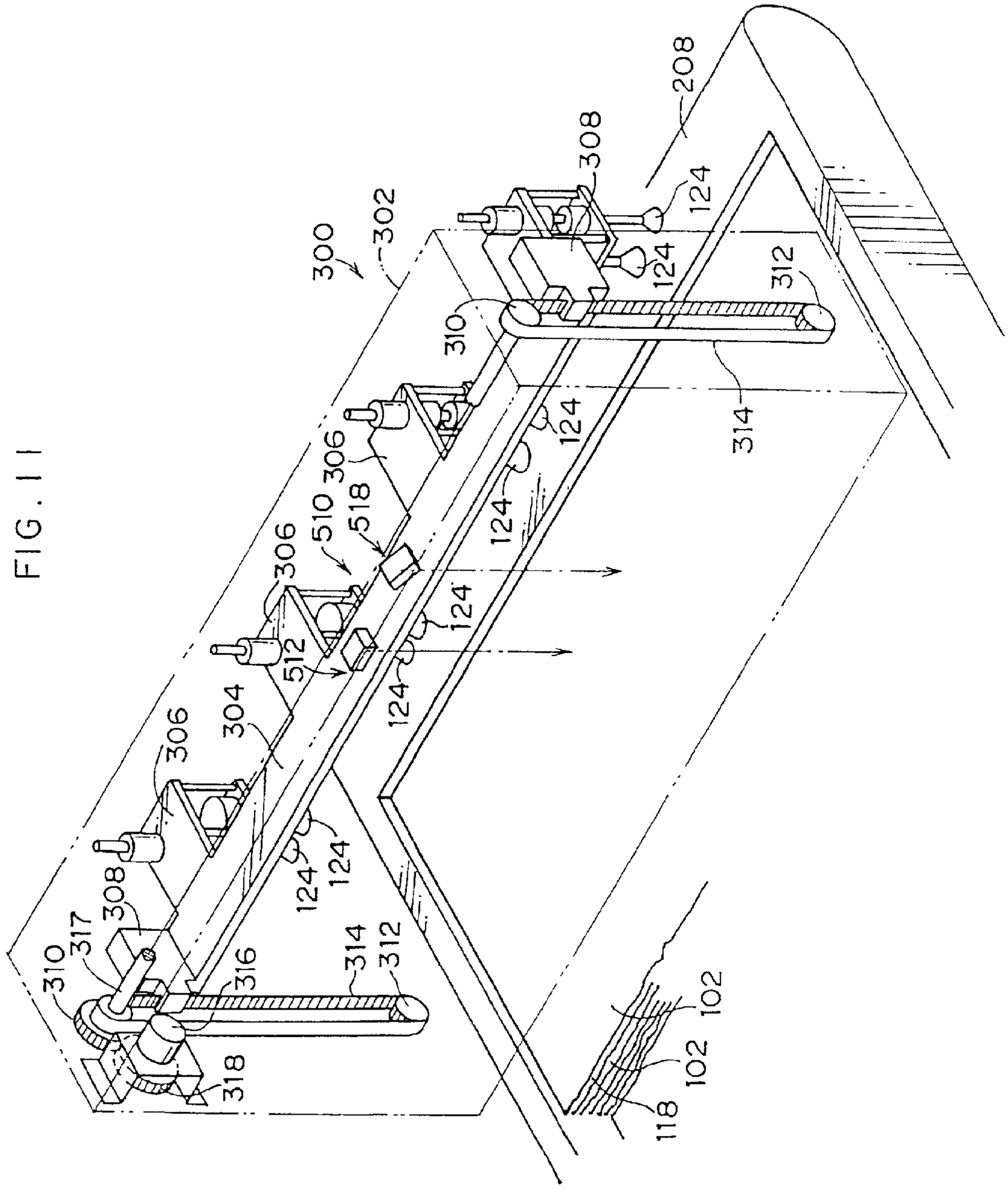
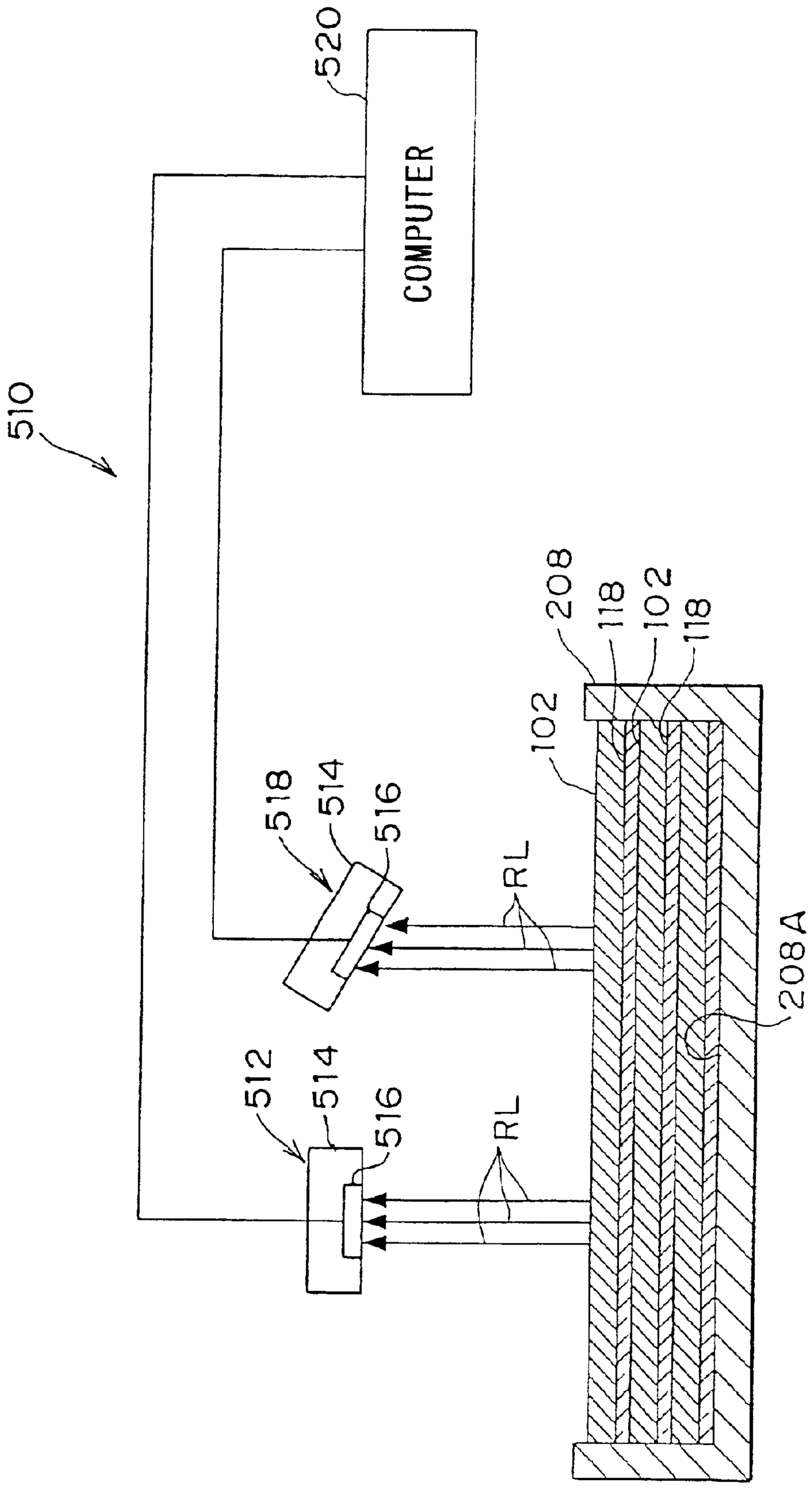

208
308
300
302
124
312
310
314
306
510
518
512
304
316
317
318
102
118

FIG. 12


520
COMPUTER
510
518
514
516
RL
102
208
118
102
118
208A
512
514
516
RL

DEVICE FOR DISCRIMINATING AMONG PRINT MEDIA

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a discriminating device for discriminating between two kinds of objects of determination based on the reflected light thereof.

2. Description of the Related Art

A technique has been developed, wherein a printing plate (hereinafter referred to as a photopolymer plate) having a photosensitive layer (for example, a photopolymerization layer) provided on a support is used and an image is directly recorded on the photopolymerization layer of the photopolymer plate by a laser beam or the like (an automatic exposure apparatus for printing plates).

In such a technique, a plurality of photopolymer plates accommodated in a magazine are taken out one-by-one from the magazine and transferred to an exposure section in which the above-described recording of images is carried out. Further, immediately before the exposure section, the photopolymer plate is basically placed on a smooth surface table and registered on the surface table, and thereafter, the photopolymer plate is transferred to the exposure section together with the surface table.

The photopolymer plates are stacked in the above-described magazine, and interleaf papers are interposed between the photopolymer plates so that the photopolymer plates and the interleaf papers are alternately stacked with one another. If a photopolymer plate is located at the uppermost position of the stack, the photopolymer plate is transferred to the exposure section as described above. If an interleaf paper is disposed at the uppermost position of the stack, the interleaf paper needs to be discharged from a conveying path to the exposure section without being transferred to the exposure section.

Accordingly, a discriminating device structured to include a laser light source disposed above the stack of photopolymer plates and interleaf papers, and a laser reflection sensor which receives laser light reflected by a surface of photopolymer plate or interleaf paper, is used to discriminate between photopolymer plate and interleaf paper based on the intensity of reflected laser light.

However, the laser reflection sensor which receives laser light is adapted to generate a signal corresponding to the intensity of received laser light, and therefore, the structure thereof is complicated and expensive. As a result, when such a laser reflection sensor is used, the discriminating device, and further, an automatic exposure apparatus for printing plates may increase in costs.

SUMMARY OF THE INVENTION

In view of the above-described facts, an object of the present invention is to provide a discriminating device by which two kinds of objects of determination having different surface reflectivities can be discriminated at a low cost.

A first aspect of the present invention is a discriminating device for discriminating between two kinds of objects of determination, which have different surface reflectivities, comprising: a first optical sensor having a light receiving portion which receives light reflected by surfaces of the objects of determination, the first optical sensor reacting to either reflected light from the two kinds of objects of determination; and a second optical sensor having a light receiving portion which receives the reflected light, the second optical sensor being provided so as to react to reflected light from one of the objects of determination, of which surface reflectivity is higher, and so as not to react to reflected light from the other object of determination of which surface reflectivity is lower.

In the discriminating device having the above-described structure, both the first optical sensor and the second optical sensor receive the reflected light from the objects of determination. First, the first optical sensor is brought into a state of reacting to either reflected light from the two kinds of objects of determination. As a result, at least a state in which the two kinds of objects of determination are located at a predetermined position to be determined, is detected, and a discrimination between the two kinds of objects can be started. Next, if the second optical sensor is in a reactive state, it can be determined that an object to be determined is one of the two kinds of objects having a higher surface reflectivity. If the second optical sensor is in a nonreactive state, it can be determined that an object to be determined is the other one of the two kinds of objects having a lower surface reflectivity. Further, for example, if the first optical sensor is in a nonreactive state, it can be determined that none of the two kinds of objects is located at a position at which the reflected light can be received by the first and second optical sensors (there are cases in which others than the two kinds of objects may be located).

As described above, the discriminating device of the present invention is adapted to discriminate between the two kinds of objects based on the difference of light-receiving level between the two kinds of optical sensors. Therefore, low-cost and general purpose optical sensors suffice. As a result, the cost of apparatus itself can be reduced.

In the discriminating device according to the first aspect of the present invention, preferably, the light receiving portion of the first optical sensor is made to face an optical axis of the reflected light, and the light receiving portion of the second optical sensor is inclined to the optical axis of the reflected light.

In the discriminating device having the above-described structure, the light receiving portion of the first optical sensor is disposed so as to face the optical axis of the reflected light, but the light receiving portion of the second optical sensor is inclined to the optical axis of the reflected light. Therefore, even if the first optical sensor and the second optical sensor have the same light-receiving level, the reflected light is obliquely received by the second optical sensor, and the light-receiving level of the second optical sensor substantially becomes low. For this reason, optical sensors of the same standard can be used for the first optical sensor and the second optical sensor, thereby resulting in that the cost of the device can be further reduced.

In the above-described discriminating device, more preferably, the first optical sensor and the second optical sensor do not each react to reflected light from a portion in which the two kinds of objects of determination are placed.

In the above-described discriminating device, neither the first optical sensor nor the second optical sensor reacts to light reflected by a portion in which the objects of determination are placed. Therefore, a state in which neither of the two kinds of objects of determination is placed in the above-described portion, can be detected.

In any one of the above-described discriminating devices, still more preferably, a printing plate on which an image is recorded, is used as one of the two kinds of objects of determination, and an interleaf paper of which surface

reflectivity is different from that of the printing plate and which is interposed between stacked printing plates, is used as the other one of the two kinds of objects of determination.

In the discriminating device having the above-described structure, one of the two kinds of objects of determination is a printing plate and the other is an interleaf paper interposed between a plurality of printing plates. In this aspect, normally, respective subsequent processing for the printing paper and interleaf paper is different from each other. When it is determined by the discriminating device whether an object to be determined is the printing paper or the interleaf paper based on the difference of surface reflectivity between the printing plate and the interleaf paper, the printing plate and the interleaf paper can be processed in a process corresponding to each of the printing plate and the interleaf paper.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view which shows an overall structure of an automatic exposure apparatus to which an embodiment of the present invention is applied.

FIG. **2** is a side view which shows a state in which photopolymer plates and interleaf papers are stacked in a magazine.

FIG. **3** is a side view of a plate supplying section.

FIGS. **4**A, **4**B, and **4**C are plan views which each show a portion of a conveying system of the plate supplying section.

FIG. **5** is a perspective view which shows a transfer portion of a different conveying system of the plate supplying section.

FIG. **6** is a cross sectional view which shows details of a forced accumulation device of sheet materials.

FIG. **7** is a plan view which shows rollers and a roll-in preventing plate of the forced accumulation device of sheet materials.

FIG. **8**A is a plan view of a surface table, and FIG. **8**B is a side view of the surface table.

FIGS. **9**A to **9**C are side views which each show an operation of a discharging mechanism section: FIG. **9**A shows a state in which a temporary supporting arm is placed at a horizontal position; FIG. **9**B shows a state in which the temporary supporting arm is placed at a retracted position; and FIG. **9**C shows a state in which the temporary supporting arm is pushed upward.

FIG. **10** is a plan view which shows a structure of a driving mechanism of a surface table in an exposure-conveying section.

FIG. **11** is a perspective view which schematically shows a structure of a sucker unit.

FIG. **12** is a diagram which schematically shows a structure of a discriminating device according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description will be hereinafter given of an automatic exposure apparatus **100** for printing plates or photopolymer plates **102** each serving as one of objects of determination, to which a discriminating device **510** according to an embodiment of the present invention is applied. First, the structure of an entire apparatus will be schematically described, and subsequently, a principal part of the embodiment of the present invention will be described.

[Overall Structure of Automatic Exposure Apparatus **100**]

FIG. **1** is a perspective view which shows an overall structure of the automatic exposure apparatus **100** for photopolymer plates according to the embodiment of the present invention. As shown in this drawing, the automatic exposure apparatus **100** is mainly divided into the following four sections: a plate supplying section **108** which operate to supply photopolymer plates **102** (see FIG. **2**); an exposure section **112** in which an image is recorded on the photopolymer plate **102**; an exposure-conveying section **110**, serving as a printing plate conveying device, for supplying the photopolymer plate **102** conveyed from the plate supplying section **108** to the exposure section **112**; and a discharging mechanism section **166** for discharging the photopolymer plate **102** on which an image has been recorded by the exposure section **112**. These sections will be described hereinafter in the order described above.

Plate Supplying Section **108**:

An automatic processing apparatus **116** can be connected at a downstream side of the automatic exposure apparatus **100** via a buffer section **114**, and supplying of plates, exposure, and processing can all be automatically processed.

As shown in FIGS. **1** and **3**, the plate supplying section **108** which operates to supply the photopolymer plates **102**, is schematically formed by the following portions: a plate accommodating portion **104** in which a carriage **200** with photopolymer plates **102** placed thereon is accommodated; a sheet feeding portion **106** for taking out the photopolymer plates **102** accommodated in the plate accommodating portion **104**; a shared conveying portion **128** which receives and conveys the photopolymer plate **102** or an interleaf paper **118**, serving as another object of determination, from the sheet feeding portion **106**; a photopolymer plate conveying portion **130** which receives the photopolymer plate **102** from the shared conveying portion **128** and conveys the same to the exposure-conveying section **110**; an interleaf paper conveying portion **134** which receives the interleaf paper **118** from the shared conveying portion **128** and conveys the same to an interleaf paper accommodating portion **132** (provided in the carriage **200**); and a conveying switch portion **136** which effects a switching operation so as to convey the photopolymer plate **102** and the interleaf paper **118** from the shared conveying portion **128** to the photopolymer plate conveying portion **130** and the interleaf paper conveying portion **134** respectively.

Plate Accommodating Section **104**:

As shown in FIG. **3**, the carriage **200** in which a handle **204** is mounted is accommodated in the plate accommodating portion **104** of the plate supplying section **108**. An accumulating portion **206** formed substantially into a right angled triangle when seen from the side surface of the apparatus is provided on a loading space **202** of the carriage **200**. Further, a magazine **208** in which a plurality of photopolymer plates **102** can be accommodated in a stack, is placed against an inclined surface of the accumulating portion **206**. As shown in FIG. **2**, the interleaf paper **118** serving as a sheet material for protecting the surface of the photopolymer plate **102**, is applied to the surface of each of the photopolymer plates. As a result, the photopolymer plates **102** and the interleaf papers **108** are alternately stacked with one another.

The magazine **208** is equipped with a shutter **210**. Due to the shutter **210** being closed in other places than a dark room, the photopolymer plates **102** are prevented from being exposed to light. Practically, the carriage **200** is conveyed between the plate accommodating section **104** and a dark room in which the photopolymer plates **102** are stored, and

therefore, exposure of the photopolymer plates **102** to light during the conveying operation is prevented by the shutter **210**.

Although not illustrated, a pair of guide plates are provided in the magazine **208** so as to adjust both transverse direction ends of each of the accommodated photopolymer plates **102** and interleaf papers **118**. Separation plates are provided at an end of each of the guide plates in such a manner as to correspond to two corners at the end of the accommodated photopolymer plates **102** and interleaf papers **118**. The separation plates are members which, when the photopolymer plate **102** is taken out from the magazine **208** by a sucker unit **300**, which will be described later in detail, functions so as to engage with the photopolymer plate **102** to bend the corners at the end of the photopolymer plate **102**, thereby separating the photopolymer plate **102** from the interleaf paper **118** disposed directly below.

Further, a pair of interleaf paper pressing plates (not shown) are provided at an intermediate portion of the magazine **208** in the transverse direction thereof. The interleaf paper pressing plates are provided so as to correspond to the interleaf paper **118** on the surface of the photopolymer plate **102** accommodated in the magazine **208**, and have a function of engaging with and holding the interleaf paper **118** when the photopolymer plate **102** is taken out from the magazine **208** by the sucker unit **300**, which will be described in detail.

As shown in FIG. **3**, the plate accommodating section **104** in which the carriage **200** having the magazine **208** is accommodated, includes a floor portion **104**A at a position higher than the floor surface FL, and the carriage **200** is formed so as to ride on the floor portion **104**A above the floor surface FL. That is, the carriage **200** is supported via casters **120** with respect to the floor surface FL and the casters **120** can be moved between a position at which it projects from the carriage **200** (that is, the position indicated by the phantom lines in FIG. **3**) and a position at which it is accommodated in the carriage **200** (that is, the position indicated by solid lines in FIG. **3**). When the casters **120** are moved to the accommodated position in such a manner as to be made retractable toward the upper side corresponding to an operation of accommodating the carriage **200** in the plate accommodating section **104**, auxiliary rollers **212** simultaneously correspond to the floor portion **104**A. Thereafter, the carriage **200** is supported by the floor portion **104**A via the auxiliary rollers **212**.

Sheet Feeding Section **106**:

The sheet feeding section **106** is provided above the above-described plate accommodating section **104**. The sheet feeding section **106** includes the sucker unit **300**. As shown in FIG. **11**, the sucker unit **300** includes a housing **302** disposed so as to face the photopolymer plates **102** and the interleaf papers **118** stacked in the magazine **208**. A movable frame **304** is accommodated in the housing **302**. The movable frame **304** has a plate-shaped configuration of which longitudinal direction corresponds to the transverse direction of the photopolymer plates **102** and the interleaf papers **118** stacked in the magazine **208**. A plurality of (for example, three in the present embodiment) sucker supporting portions **306** are formed at an intermediate portion in the longitudinal direction of the movable plate **304** at predetermined intervals along the movable plate **304**, and the sucker supporting portions **306** each support a sucker **124** facing the photopolymer plates **102** and the interleaf papers **118**. Further, brackets **308** are respectively provided at both longitudinal direction ends of the movable frame **304** and are formed integrally with the movable frame **304**.

A gear **310** of which axial direction corresponds to the longitudinal direction of the movable frame **304** is provided on an inner wall of the housing **302** at one of the longitudinal direction ends of the movable frame **304**. A gear **312** is disposed below the gear **310**, namely, at the side close to the magazine **208**. A toothed belt **314** is entrained around these gears **310** and **312**.

Further, the gear **310** is engaged with an output gear **318** of a motor **316** provided within the housing **302**. Therefore, the gear **310** is rotated due to rotating force of the motor **316** and the toothed belt **314** is thereby rotated.

The gears **310** and **312**, and the toothed belt **314** are also provided on the inner wall of the housing **302** at the other longitudinal direction end of the movable frame **304**, but a driving device such as the motor **316** is not provided at the other longitudinal direction end of the movable frame **304**.

The brackets **308** of the movable frame **304** are respectively engaged with the above-described one pair of toothed belts **314**. Due to one of the toothed belts **314** being rotated by rotating force of the motor **316**, the movable frame **304** moves close to and apart from the photopolymer plates **102** and the interleaf papers **118**. When the movable frame **304** moves close to the photopolymer plates **102** and the interleaf papers **118**, the photopolymer plates **102** and the interleaf papers **118** are alternately taken out by being suction adhered to the suckers **124**, and further conveyed to the shared conveying portion **128**. Further, the sheet feeding section **106** includes a fan (not shown) in addition to the suckers **124**. When the interleaf paper **118** is suction adhered to the suckers **124**, the suction fan is disposed slightly apart from the interleaf paper **118** (or may be brought into contact with the interleaf paper **118**), and only the interleaf paper **118** which is formed as a light weight and thin paper, is sucked to be lifted up by operating only the suction fan. Thereafter, the interleaf paper **118** is suction adhered to the suckers **124**, thereby preventing double suction at the time of suction-adhering of the interleaf paper **118** (that is, a state in which the photopolymer plate **102** located directly below the interleaf paper **118** is suction adhered together with the interleaf paper **118**).

Shared Conveying Portion **128**, Photopolymer Plate Conveying Portion **130**, and Conveying Switch Portion **136**:

As shown in FIG. **1**, the photopolymer plate **102** or the interleaf paper **118** conveyed from the sheet feeding section **106** is conveyed by the shared conveying portion **128**. Thereafter, the conveying direction is selectively switched by the conveying switch portion **136**. The photopolymer plate **102** is conveyed by the photopolymer plate conveying portion **130** to a surface table **402**, and the interleaf paper **118** is conveyed by the interleaf paper conveying portion **134** to the interleaf paper accommodating portion **132** provided in the carriage **200**. That is, the photopolymer plates **102** and the interleaf papers **118** are alternately stacked with one another, and therefore, the conveying switch portion **136** is switched over each time these plates and papers are each adhered by suction in the sheet feeding section **106**, and the photopolymer plates **102** and the interleaf papers **118** are each adapted to be conveyed in a predetermined direction. There are many points at which structures are common to the shared conveying portion **128**, the photopolymer plate conveying portion **130**, and the conveying switch portion **136**, and therefore, they will be collectively described hereinafter.

As shown in FIG. **1** and FIG. **4**A, in each of the shared conveying portion **128** and the conveying switch portion **136**, a conveying system in which skewered rollers **138** and narrow belts **140** are combined together, is used and the

photopolymer plate **102** is mainly conveyed by the conveying system (see FIG. **4**B). That is, the photopolymer plate **102** is conveyed by a strong holding force of the skewered rollers **138**, and the narrow belts **140** each serve as a guide plate which moves synchronously with the conveying of the photopolymer plate **102**. On the other hand, as shown in FIG. **1** and FIG. **4**C, the interleaf paper conveying portion **134** is a conveying system comprised of only the narrow belts **140**, in which the interleaf paper **118** is conveyed by a weak holding force of the narrow belts **140**.

Further, as shown in FIG. **5**, in a transfer portion of each conveying portion, respective head (turn-back) portions of the belts **140** are alternately protruded in a skewered manner so that a concave region between adjacent belts **140** on one side faces a protruding head portion of the belt **140** on another side and a protruding head portion of the belt **140** on the one side faces a concave region between adjacent belts **140** on the another side (that is, a common coaxial conveying path is provided). Accordingly, there is prevented a drawback in that when the photopolymer plate **102** and the interleaf paper **118** are each transferred between the conveying portions, the photopolymer plate **102** and the interleaf paper **118** are wound in the skewered rollers **138** or in the narrow belts **140**.

Interleaf Paper Conveying Portion **134**:

As shown in FIG. **3**, the interleaf paper accommodating portion **132** is provided in the carriage **200** and the interleaf papers **118** conveyed by the interleaf paper conveying portion **134**, which will be described later, are accommodated in the interleaf paper accommodating portion **132**. Further, a sheet material forced accumulation device **141** is provided at an upper end of the interleaf paper accommodating portion **132** in the carriage **200** so as to forcedly accumulate, in the interleaf paper accommodating portion **132**, the interleaf papers **118** conveyed by the interleaf paper conveying portion **134**.

FIG. **6** shows a detailed structure of the sheet material forced accumulation device **141**. As shown in this figure, in the sheet material forced accumulation device **141**, a pair of rollers **144** serving as nipping and feeding rollers are provided at an insertion opening **142** of the interleaf paper **118** provided at an upper end of the interleaf paper accommodating portion **132**. As shown in FIG. **7**, the pair of rollers **144** are skewered rollers and are driven to rotate at a linear velocity which is a little higher (about 1.1 times) than a conveying speed set in the interleaf paper conveying portion **134**. As a result, when the interleaf paper **118** is suspended between the interleaf paper conveying portion **134** and the rollers **144**, the interleaf paper **118** is conveyed while a predetermined tension state is maintained (that is, in a freely stretched manner), jamming of the interleaf paper **118** caused by slackness formed therein, or the like can be prevented.

Returning now to FIG. **6**, a tapered guide plate **146** of which widthwise dimension (in the direction of thickness of the interleaf paper **118**) gradually decreases, is provided at the front side of the insertion opening **142**. Further, the tapered guide plates **146** facing each other are each provided with a charge removing brush **148** so as to remove charge from the interleaf paper **118** to be inserted in the insertion opening **142**.

A wind-in preventing plate **150** is provided in a vicinity of a lower portion of the pair of rollers **144** along irregularities formed by the skewered shape of the rollers **144**. Accordingly, even if the interleaf paper **118** having passed through the rollers **144** and accumulated in the interleaf paper accommodating portion **132** partially contacts the rollers **144**, wind-in of the interleaf paper **118** can be prevented by the wind-in preventing plate **150**.

Exposure-Conveying Section **110**:

As shown in FIG. **1**, the exposure-conveying section **110** includes the surface table **402**. The photopolymer plate **102** conveyed by the photopolymer plate conveying portion **130** and separated therefrom in a state of being horizontally conveyed, is transferred to the surface table **402** and placed on the upper surface thereof.

The upper surface of the surface table **402** is disposed at a position lower than a position at which the photopolymer plate **102** is horizontally conveyed by the photopolymer plate conveying portion **130**, and there is a space or gap between the surface table **402** and the photopolymer plate conveying portion **130** in the direction in which the photopolymer plate **102** is conveyed. For this reason, the photopolymer plate **102** discharged from the photopolymer plate conveying portion **130** arrives on the surface table **402** in such a manner that the leading end thereof slightly hangs, and the trailing end of the photopolymer plate **102** in the conveying direction is positioned further at the upstream side of the surface table **402** in the conveying direction of the plate **102**. As shown in FIG. **8**, a temporary supporting arm **154** provided in the discharging mechanism portion **166**, which will be described later, is disposed at the upstream side of the surface table **402** so as to prevent hanging of the photopolymer plate **102**.

A movable body **152** is provided in the vicinity of the temporary supporting arm **154** so as to be capable of moving close to and apart from the surface table **402**. Further, the movable body **152** includes a pressing plate **156** which pushes the trailing end of the photopolymer plate **102** in the conveying direction. When the pressing plate **156** pushes the trailing end of the photopolymer plate **102**, a diagonal feed of the photopolymer plate **102** is cancelled, and the photopolymer plate **102** can be conveyed to a predetermined reference position in the conveying direction. The reference position is a position at which the trailing end of the photopolymer plate **102** in the conveying direction protrudes from the surface table **402** by a small amount.

At the reference position, sensors **158** are provided at plural positions including two corners at the trailing end of the photopolymer plate **102** in the conveying direction. Due to the trailing end of the photopolymer plate **102** being detected by these sensors **158**, pushing by the pressing plate **156** is stopped. Further, these sensors **158** are also used to detect positions on the photopolymer plate **102** along the transverse direction perpendicular to the conveying direction. That is, the corners of the photopolymer plate **102** and the sensors **158** are caused to coincide with each other by the surface table **402** moving in the transverse direction of the photopolymer plate **102** perpendicular to the conveying direction, and the position at which the corners of the photopolymer plate **102** and the sensors coincide with each other is registered as an initial position of the photopolymer plate **102**.

The position of the photopolymer plate **102** moved to the initial position is set so as to become a relative position for a scanning-exposure starting position in the exposure section **112**, which will be described later. In this state, the photopolymer plate **102** is adhered by suction to and held by a suction groove **110**A provided in the surface table **402**. A puncher **160** provided in the movable body **152** punches holes in the photopolymer plate **102** adhered by suction and held by the surface table **402**.

A ball screw **412** which forms a driving device is disposed below the surface table **402**. As shown in FIG. **10**, the ball

screw **412** is disposed in such a manner that the longitudinal direction (axial direction) thereof extends from an initial position of the photopolymer plate **102** (that is, a position at which the photopolymer plate **102** separated from the photopolymer plate conveying portion **130** is transferred) to the exposure section **112**, which will be described later. A supporting stand **414** is disposed at one of longitudinal direction ends of the ball screw **412** and supports the one longitudinal direction end of the ball screw **412** rotatably therearound. On the other hand, an actuator **416** which forms, together with the ball screw **412**, the driving device is disposed at another longitudinal direction end of the ball screw **412**. The another longitudinal direction end of the ball screw **412** is rotatably supported by a supporting stand **418** provided in the actuator **416**, around the another longitudinal direction end of the ball screw **412**.

The actuator **416** includes a motor **420**. An output axis of the motor **420** is disposed so that an axial direction thereof is made parallel to the ball screw **412**, and an external gear **422** is formed at an end of the output axis. Further, a gear **424** is formed in the vicinity of another longitudinal direction end of the ball screw **412** coaxially therewith, and the gear **422** and the gear **424** are connected by a toothed belt **426**. As a result, driving force of the motor **420** is transmitted to the ball screw **412**.

A guide bar **428** is disposed at the side of the ball screw **412**, and a guide bar **430** is disposed at the side of the ball screw **412** opposite to the side at which the guide bar **428** is disposed. The guide bars **428** and **430** are disposed parallel to the ball screw **412**.

A slider **432** is fixed integrally to a lower side of the surface table **402**. The slider **432** is formed into a block-shaped member as a whole. A screw hole **434** is formed in the slider **432** so as to pass therethrough along the axial direction of the ball screw **412**, and the ball screw **412** is screwed with the screw hole **434** in a state of passing therethrough. Through holes **436** and **438** are formed at both sides of the screw hole **434** respectively. An inner diameter of the through hole **436** is made slightly larger than an outer diameter of the guide bar **428**, and the guide bar **428** passes through the through hole **436**. Further, an inner diameter of the through hole **438** is made slightly larger than an outer diameter of the guide bar **430**, and the guide bar **430** passes through the through hole **438**. Due to the guide bars **428** and **430** passing through the, through holes **436** and **438** respectively, displacement of the slider **432** in other directions than the longitudinal direction of the guide bars **428** and **430** is restricted by the guide bars **428** and **430**.

Exposure Section **112**:

As shown in FIG. **1**, in the exposure section **112**, a scanning unit **164** is provided at a position above the conveying path on the surface table **402**. Main scanning (in a direction perpendicular to the moving direction of the surface table **402**) is carried out using laser beams which are controlled so as to be switched in accordance with an image signal. Forward movement of the surface table **402** is sub-scan movement. As a result, during the forward movement of the surface table **402** to the exposure section **112**, an image is recorded on the photopolymer plate **102** held on the surface table **402**, and the photopolymer plate **102** is moved back to an original position by backward movement of the surface table **402**. After the photopolymer plate **102** placed on the surface table **402** has been moved back to the original position, vacuum application is terminated thereby releasing the photopolymer plate **102**.

Discharging Mechanism Section **166**:

In correspondence to the surface table **402** on which the photopolymer plate **102** with an image being recorded is moved back to the original position, the discharging mechanism section **166** is provided at the side of the trailing end of the photopolymer plate **102**, in the conveying direction of the plate **102** by the photopolymer plate conveying portion **130** (at a position close to the movable body **152**).

As shown in FIG. **9**, in the discharge mechanism section **166**, the above-described one pair of temporary supporting arms **154** are swingably supported by a stage base **168** via a supporting shaft **170**, and ends of the temporary supporting arms **154** are positioned in the vicinity of the surface table **402**. A convex portion **172**, a concave portion **174**, and a convex portion **176** having different dimensions (heightwise or depthwise dimensions) are formed on a lower surface of the temporary supporting arm **154**.

A moving stage **178** is disposed below the temporary supporting arm **154**. The moving stage **178** can move along the temporary supporting arm **154**. A roller **180** is provided at an end of the moving stage **178** and abuts against the lower surface of the temporary supporting arm **154**. Accordingly, due to movement of the moving stage **178**, a position at which the roller **180** abuts against and is supported by the temporary supporting arm **154** (that is, the convex portion **172**, the concave portion **174**, and the convex portion **176**) is changed, and the upper position of the end of the temporary supporting arm **154** is thereby changed. Further, a spring **182** is connected at a basal end of the temporary supporting arm **154**, and the temporary supporting arm **154** is adapted to constantly follow the movement of the moving stage **178**.

The respective dimensions of the convex portion **172**, the concave portion **174**, and the convex portion **176** are set such that: in a state in which the roller **180** abuts against and is supported by the convex portion **172**, the temporary supporting arm **154** is, as shown in FIG. **9**A, placed at the same horizontal position as the surface table **402**; in a state in which the roller **180** abuts against and is supported by the concave portion **174**, the temporary supporting arm **154** is, as shown in FIG. **9**B, placed at a position lower than the surface table **402**, that is, at a retracted position; and in a state in which the roller **180** abuts against and is supported by the convex portion **176**, the temporary supporting portion **154** is, as shown in FIG. **9**C, placed at a position higher than the surface table **402**, that is, at a pushed-up position. Accordingly, when the roller **180** of the moving stage **178** abuts against the convex portion **172** of the temporary supporting arm **154** and the temporary supporting arm **154** is placed at the same horizontal position as the surface table **402**, hanging of the photopolymer plate **102** on the surface table **402** can be prevented. Further, when the roller **180** of the moving stage **178** abuts against the convex portion **176** of the temporary supporting arm **154** and the temporary supporting arm **154** is pushed up and placed at a position higher than the surface table **402**, a trailing end of the photopolymer plate **102** placed on the surface table **402** can be lifted up.

A pair of sensors **184** and **186** are disposed below the moving stage **178**. These sensors **184** and **186** each detect a dog **188** provided in the moving stage **178** so as to detect the position of the moving stage **178**, that is, the position of the temporary supporting arm **154**. In a state in which the dog **188** is detected by only the sensor **184**, the temporary supporting arm **154** is placed at the same horizontal position as the surface table **402**. In a state in which the dog **188** is detected by both of the sensors **184** and **186**, the temporary supporting arm **154** is placed at the retracted position lower than the surface table **402**. In a state in which the dog **188** is detected by only the sensor **186**, the temporary supporting

arm **154** is pushed up and placed at a position higher than the surface table **402**.

Further, in the discharging mechanism section **166**, a pair of plate discharging claws **190** are provided above the temporary supporting arms **154**. As shown in FIGS. **9**B and **9**C, the pair of plate discharging claws **190** can be moved along a guide rail (not shown) disposed along the surface table **402**. That is, the plate discharging claws **190** passes above the surface table **402** and moves to the leading end of the photopolymer plate **102** in the conveying direction.

In a state in which the trailing end of the photopolymer plate **102** protruded from the surface table **402** is lifted up by the temporary supporting arms **154** as described above, the plate discharging claws **190** move in the direction in which the photopolymer plate **102** is conveyed to thereby catch the photopolymer plate **102**. Accordingly, the photopolymer plate **102** caught by the plate discharging claws **190** is adapted to be conveyed to a downstream side of the surface table **402** accompanied with the movement of the plate discharging claws **190**.

As described above, as shown in FIG. **1**, when supply of plates, exposure, and development are all automatically processed in such a manner that the automatic developing apparatus **116** is connected via a buffer section **114** at a downstream side of the above-described surface table **402**, the photopolymer plate **102** is smoothly conveyed while eliminating, by the buffer section **114**, the difference between the discharging speed in the discharging mechanism section **166** and the conveying speed in the automatic developing apparatus **116**.

[Structure of Discriminating Device **510**]

Next, a description will be given of the structure of the discriminating device **510** according to the embodiment of the present invention. As shown in FIG. **11**, the discriminating device **510** includes an optical sensor **512** serving as a first optical sensor which is provided on an upper wall of the housing **302** forming the sucker unit **300**. As shown in FIG. **12**, the optical sensor **512** is formed by a case **514** and a light receiving portion **516** provided in the case **514**. When the light receiving portion **516** receives light having a predetermined intensity, an electric signal is generated (that is, the optical sensor **512** is brought into a reactive state). The optical sensor **512** is set so that the light receiving portion **516** faces an optical axis of reflected light RL emitted from a light source (not shown) and reflected by the surface of the photopolymer plate **102** or the interleaf paper **118** located at an uppermost position in the stack, and even if the reflected light from the photopolymer plate **102** or the interleaf paper **118** is received, an electric signal is generated. However, an electric signal is not generated by reflected light RL from a bottom wall **208**A of the magazine **208** (that is, the optical sensor **512** is brought into a nonreactive state). In other words, the bottom wall **208**A of the magazine **208** has a surface reflectivity lower than those of the photopolymer plate **102** and the interleaf paper **118**. For this reason, the light receiving portion **516** cannot detect the reflected light RL from the bottom wall **208**A of the magazine **208**. The surface reflectivity of the bottom wall **208**A needs to be made lower than those of the photopolymer plate **102** and the interleaf paper **188**. Accordingly, when the surface reflectivity of the bottom wall **208**A is equal to or higher than those of the photopolymer plate **102** and the interleaf paper **188**, a coating material of color such as black or brown, by which light is not reflected or is difficult to be reflected, is applied to the bottom wall **208**A so that the surface reflectivity of the bottom wall **208**A can be lowered intentionally.

Further, as shown in FIG. **11**, an optical sensor **518** serving as a second optical sensor is disposed at the side of the optical sensor **512** in the longitudinal direction of the movable frame **304**. As shown in FIG. **12**, the optical sensor **518** has the same structure as that of the optical sensor **512** in that it is formed by the case **512** and the light receiving portion **516** provided in the case **512**. Further, operationally, when the light receiving portion **516** of the optical sensor **518** receives light of which intensity is greater than or equal to the intensity of light received by the light receiving portion **516** of the optical sensor **512**, an electric signal is generated (that is, the optical sensor **518** is brought into a reactive state). However, as shown in FIG. **12**, the light receiving portion **516** of the optical sensor **518** is disposed so as to be inclined by a predetermined angle to an optical axis of the reflected light RL, and therefore, an amount of light received by the light receiving portion **516** of the optical sensor **518** per unit area decreases. As a result, the level at which reflected light is detected by the optical sensor **518** substantially becomes lower as compared with the optical sensor **512**. Accordingly, for example, when reflected light at a lower limit level at which receiving of light can be detected is received by each light receiving portion **516**, an electric signal is generated by the optical sensor **512**, but no electric signal is generated by the optical sensor **518**.

The detection level of the optical sensor **518** in a state of being installed in the housing **302** is adapted so as to detect that reflected light from the photopolymer plate **102** is received, and so as not to detect reflected light from the interleaf paper **118** of which surface reflectivity is lower than that of the photopolymer plate **102**. In order to correspond to the above-described detection level of the optical sensor **518**, the angle of inclination of the optical sensor **518** is set.

Further, as shown in FIG. **12**, the respective light receiving portions **516** of the optical sensors **512** and **518** are electrically connected to a computer **520** serving as the discriminating device, and an electric signal from each of the light receiving portions **516** is transferred to the computer **520**.

In the computer **520**, based on the electric signal from each of the light receiving portions **516**, it is determined whether the uppermost layer of the photopolymer plates **102** and the interleaf papers **118** stacked in the magazine **208** is the photopolymer plate **102** or the interleaf paper **118**, or whether nothing is placed in the magazine **208**. Based on the result of this determination, a suction fan of the sheet feeding section **106**, or the conveying switch portion **136** is controlled.

[Operation and Effects of the Present Embodiment]

Next, operation and effects of the present embodiment will be described.

First, overall operation of the automatic exposure apparatus **100** will be briefly described.

The photopolymer plates **102** and the interleaf papers **118** accommodated in the magazine **208** are alternately taken out by a suction conveying device **109** (that is, the suction unit **304**), and conveyed to the shared conveying portion **128**. The photopolymer plate **102** conveyed to the shared conveying portion **128** is further conveyed by the photopolymer plate conveying portion **130** and placed and positioned on the surface table **402** of the exposure-conveying section **110**. After positioning of the photopolymer plate **102**, which will be described later, is completed, the surface table **402** moves to slide from a first position at which the photopolymer plate **102** is received (the position indicated by the solid lines in FIG. **1**) to a second position at which the photopolymer plate **102** is accommodated in the exposure section **112** (the

position indicated by the phantom lines in FIG. **1**). As a result, the photopolymer plate **102** is accommodated in the exposure section **112** and an image is exposed in the exposure section **112**. After exposure processing for the photopolymer plate **102** in the exposure section **112** is completed, the surface table **402** moves to slide from the second position to the first position. When the surface table **402** moves back to the first position, the photopolymer plate **102** is discharged from the discharging mechanism section **166**. On the other hand, the interleaf paper **118** is conveyed by the shared conveying portion **128** and the interleaf paper conveying portion **134**, and accumulated in the interleaf paper accommodating portion **132** by the sheet material forced accumulation device **141** provided in the carriage **200**.

Next, operation and effects of the exposure-conveying section **110** according to the present embodiment will be described.

Next, operation and effects of the discriminating device **510** will be described.

The discriminating device **510** operates at a stage before the photopolymer plate **102** or the interleaf paper **118** is suction adhered to the suckers **124**, that is, before the motor **316** is actuated.

First, the discriminating device **510** causes light from a light source (not shown) to be emitted to the photopolymer plates **102** and the interleaf papers **118** stacked in the magazine **208**. The emitted light is reflected by the surface of the uppermost layer of the photopolymer plates **102** and the interleaf papers **118** in the stack and made into reflected light RL. The reflected light RL is received by the respective light receiving portions **516** of the optical sensors **512** and **518**.

When the photopolymer plate **102** is located at the uppermost position and the reflected light RL by the photopolymer plate **102** is received by the light receiving portion **516** of the optical sensor **512**, the light receiving portion **516** of the optical sensor **512** generates an electric signal (that is, the optical sensor **512** is brought into a reactive state). Further, when the reflected light RL by the photopolymer plate **102** is received by the light receiving portion **516** of the optical sensor **518**, the light receiving portion **516** of the optical sensor **518** also generates an electric signal (that is, the optical sensor **518** is brought into a reactive state). When the computer **520** receives signals from the light receiving portions **516** of the optical sensors **512** and **518** (that is, when it is recognized by the computer **520** that the optical sensors **512** and **518** are both placed in the reactive state), it is determined that the photopolymer plate **102** is located at the uppermost position, and the motor **316** is rotated until the suckers **124** arrives at a position at which the photopolymer plate **102** can be suction adhered to the suckers **124**. Further, the conveying switch portion **136** is controlled so that the photopolymer plate **102** conveyed to the shared conveying portion **128** is further conveyed to the photopolymer plate conveying portion **130**.

The surface reflectivity of the interleaf paper **118** is lower than that of the photopolymer plate **102**, and therefore, when the interleaf paper **118** is located at the uppermost position, the intensity of the reflected light RL by the interleaf paper **118** is lower than that of the reflected light RL by the photopolymer plate **102**. Even if the light receiving portion **516** of the optical sensor **512** receives the reflected light RL by the interleaf paper **118**, it generates an electric signal. On the other hand, the light receiving portion **516** of the optical sensor **518** is disposed so as to be inclined to the optical axis of the reflected light RL, and therefore, an amount of light received by the light receiving portion **516** of the optical sensor **518** per unit area decreases. As a result, the detection level of the reflected light in the optical sensor **518** substantially becomes low as compared with the optical sensor **512**.

For this reason, even if the light receiving portion **516** of the optical sensor **518** receives the reflected light RL by the interleaf paper **118** of which intensity is lower than the reflected light RL by the photopolymer plate **102**, the optical sensor **518** does not detect that the light receiving portion **516** has received the reflected light RL. As a result, no electric signal is generated from the light receiving portion **516** of the optical sensor **518** (that is, the optical sensor **518** remains in a nonreactive state). The computer **520** receives a signal from the light receiving portion **516** of the optical sensor **512**, but does not receive a signal from the light receiving portion **516** of the optical sensor **518** (that is, it is recognized by the computer **520** that the optical sensor **512** is in a reactive state and the optical sensor **518** is in a nonreactive state). As a result, it is determined that the interleaf paper **118** is located at the uppermost position. A blower is operated so as to lift up the interleaf paper **118**, and the motor **316** is rotated until the suckers **124** arrives at a position at which the interleaf paper **118** can be suction adhered to the suckers **124**. Further, the conveying switch portion **136** is controlled so that the interleaf paper **118** conveyed to the shared conveying portion **128**, is further conveyed to the interleaf paper conveying portion **134**.

Further, when neither the photopolymer plate **102** nor the interleaf paper **118** is placed in the magazine **208**, light is reflected by the bottom wall **208**A of the magazine **208**. The surface reflectivity of the bottom wall **208**A is lower than those of the photopolymer plate **102** and the interleaf paper **118**. Accordingly, even if the light receiving portion **516** of the optical sensor **512** receives the reflected light RL by the bottom wall **208**A of the magazine **208**, the light receiving portion **516** of the optical sensor **512** does not detect the reflected light RL. Naturally, the light receiving portion **516** of the optical sensor **518** whose detection level is substantially low, also does not detect the reflected light RL, and therefore, no electric signal is generated from both of the light receiving portions **516** of the optical sensors **512** and **518** (that is, the optical sensors **512** and **518** are both in a nonreactive state).

In the computer **520**, due to no signal from both of the light receiving portions **516** of the optical sensors **512** and **518** being received (that is, the computer **520** recognizes that the optical sensors **512** and **518** are both in a nonreactive state), it is determined that neither the photopolymer plate **102** nor the interleaf paper **118** is placed in the magazine **208**. A notice of this determination is given to an operator, for example, by lighting a lamp of a control panel.

As described above, in the discriminating device **510**, it can be determined by the pair of optical sensors **512** and **518** whether the uppermost layer of the stack is the photopolymer plate **102** or the interleaf paper **118**, or whether nothing is placed in the magazine **208**. In this case, it suffices that the light receiving portions **516** of the optical sensors **512** and **518** in the discriminating device **510** each detect as to whether light of which intensity is a predetermined value or more has been received (that is, it is not necessary for the light receiving portions **516** to identify intensities of three or more kinds of light). Therefore, low-cost general purpose optical sensors can be applied to the optical sensors **512** and **518** of the discriminating device **510**. Accordingly, the discriminating device **510** can be manufactured at a low cost and the manufacturing cost of the automatic exposure apparatus **100** can be reduced. Further, the optical sensors **512**

and **518** basically have the same structure, and therefore, the manufacturing cost thereof can also be reduced by reason that the number of kinds of parts to be used can be decreased.

What is claimed is:

1. A discriminating device for discriminating between two kinds of objects of determination, which have different surface reflectivities, said device comprising:

a first optical sensor having a light receiving portion which receives light reflected by surfaces of the objects of determination, said first optical sensor reacting to reflected light from both two kinds of objects of determination individually; and

a second optical sensor having a light receiving portion which receives the reflected light, said second optical sensor being provided so as to react to reflected light from one of the objects of determination, of which surface reflectivity is higher, and so as not to react to reflected light from the other object of determination of which surface reflectivity is lower;

wherein the reflected light incident upon the light receiving portion of the first optical sensor is substantially perpendicular to a surface of the light receiving portion of the first optical sensor that receives the reflected light, and the reflected light incident upon the light receiving portion of the second optical sensor is oblique to a surface of the light receiving portion of the second optical sensor that receives the reflected light.

2. A discriminating device according to claim **1**, wherein the light receiving portion of said first optical sensor is made to face an optical axis of the reflected light, and the light receiving portion of said second optical sensor is inclined to the optical axis of the reflected light.

3. A discriminating device according to claim **1**, wherein said first optical sensor and said second optical sensor do not each react to reflected light from a portion in which the two kinds of objects of determination are placed.

4. A discriminating device according to claim **1**, wherein a printing plate on which an image is recorded, is used as one of the two kinds of objects of determination, and an interleaf paper of which surface reflectivity is different from that of the printing plate and which is interposed between stacked printing plates, is used as the other one of the two kinds of objects of determination.

5. A discriminating device according to claim **2**, wherein said first optical sensor and said second optical sensor do not each react to reflected light from a portion in which the two kinds of objects of determination are placed.

6. A discriminating device according to claim **2**, wherein optical sensors of the same specifications are used for said first optical sensor and said second optical sensor.

7. A discriminating device according to claim **3**, wherein a printing plate on which an image is recorded, is used as one of the two kinds of objects of determination, and an interleaf paper of which surface reflectivity is different from that of the printing plate and which is interposed between stacked printing plates, is used as the other one of the two kinds of objects of determination.

8. A discriminating device according to claim **5**, wherein a printing plate on which an image is recorded, is used as one of the two kinds of objects of determination, and an interleaf paper of which surface reflectivity is different from that of the printing plate and which is interposed between stacked printing plates, is used as the other one of the two kinds of objects of determination.

9. A discriminating device for discriminating between sheets of different kinds of materials, wherein different kinds of materials have different surface reflectivities, the device comprising:

(a) a support for supporting a sheet of material;

(b) an optical sensing arrangement disposed in relation to the support for receiving light reflected from the sheet of material, the optical sensing arrangement having at least one sensor, which when operated, produces an electronic output when the reflected light received from the sheet at least equals a predetermined value, and does not produce output when the reflected light received from the sheet is less than the predetermined value; and

(c) a computer connected in electronic communication to the optical sensor and receiving the electronic output from the sensor, the computer including program logic which determines the kind of material in accordance with the electronic output received;

wherein the reflected light incident upon a light receiving portion of a first sensor of the at least one sensor is substantially perpendicular to a surface of the light receiving portion of the first sensor that receives the reflected light, and the reflected light incident upon a light receiving portion of a second sensor of the at least one sensor is oblique to a surface of the light receiving portion of the second sensor that receives the reflected light.

10. A discriminating device according to claim **9**, wherein the optical sensing arrangement includes at least two sensors, each sensor when operated, producing an electronic output when reflected light received from the sheet of material reaches a predetermined value for that sensor, with the computer receiving the electronic output from each sensor, the computer program logic determining that the material is of one kind, if electronic output is received from both sensors, and the material is another kind if electronic output is received from one sensor, and not the other sensor.

11. A discriminating device according to claim **10**, wherein each sensor is oriented differently, relative to the support.

12. A discriminating device according to claim **10**, wherein the computer program logic determines a sheet of material is not present if electronic output is received from neither sensor.

13. A discriminating device according to claim **9**, wherein the support comprises a magazine for supporting the sheets of different kinds of materials in a stacked, interleaved arrangement with one another.

14. A discriminating device according to claim **10**, wherein the sensors are disposed above the support.

15. A discriminating device according to claim **10**, wherein each sensor includes a sensing surface, one of the sensors having its sensing surface facing the support, and the other sensor having its sensing surface inclined relative to the sensing surface of the one sensor.

16. A discriminating device for discriminating between two kinds of objects, wherein each object has a surface with a reflectivity different from the other object and reflects light from the surface along an optical axis, the device comprising:

(a) a first optical sensor having a light receiving portion disposed facing the optical axis, which receives light reflected from the surfaces of the objects, said first optical sensor reacting to reflected light from both two kinds of objects of determination individually; and

(b) a second optical sensor having a light receiving portion disposed at an inclination to the optical axis, and provided so as to react to reflected light received from one kind of object, and not to reflected light received from another kind of object;

wherein the reflected light incident upon the light receiving portion of the first optical sensor is substantially perpendicular to a surface of the light receiving portion of the first optical sensor that receives the reflected light, and the reflected light incident upon the light receiving portion of the second optical sensor is oblique to a surface of the light receiving portion of the second optical sensor that receives the reflected light.

17. A discriminating device according to claim **16**, wherein the objects are placed in a magazine, and the sensors do not react to light reflected from the magazine.

18. A discriminating device according to claim **16**, wherein the objects are placed in a magazine, and one of the kinds of object is a printing plate having an image recording surface, and the other kind of object is an interleaf paper, for interposing between printing plates in a stack of printing plates.

19. A discriminating device according to claim **17**, wherein one of the kinds of object is a printing plate having an image recording surface, and the other kind of object is an interleaf paper, for interposing between printing plates in a stack of printing plates placed in the magazine.

20. A discriminating device according to claim **17**, wherein each sensor has specifications substantially identical to one another.

21. The discriminating device of claim **1**, wherein the first optical sensor reacts to reflected light from both two kinds of objects of determination.

22. The discriminating device of claim **21**, wherein the first optical sensor and the second optical sensor have substantially the same specifications.

23. The discriminating device of claim **22**, wherein the first optical sensor and the second optical sensor have substantially the same threshold specifications.

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